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C. Renn Tumlison

Henderson State University, tumlison@hsu.edu

Grace Wills

Henderson State University, gewills30@gmail.com

Karen Rowe

AR Game and Fish Commission, karen.rowe@agfc.ar.gov

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Cover Page Footnote

We thank the many bird enthusiasts who systematically collect and report observations of birds, Jami Linder who took the first photographs of Roseate Spoonbills nesting in Arkansas, and the anonymous landowner whose interest in avian conservation created the habitat in which the birds nested. We thank Dan Scheiman for his efforts in updating the eBird data base for Arkansas birds, which made this project much easier to conduct. Rick Hampton provided access for viewing Hampton Reservoir, which provided evidence of a second likely nesting site for these birds in Arkansas.

Distribution and History of the Roseate Spoonbill (*Platalea ajaja*) in Arkansas

R. Tumblison^{*1}, G. Wills¹, and K. Rowe²

¹*Department of Biological Sciences, Henderson State University, Arkadelphia, AR 71999*

²*Arkansas Game and Fish Commission, P.O. Box 529, Casscoe, AR 72026*

*Correspondence: tumblison@hsu.edu

Running Title: Roseate Spoonbill in Arkansas

Abstract

The Roseate Spoonbill (*Platalea ajaja*) is a rare bird in Arkansas and was not reported from the state until 1959, when it was seen in southwestern Arkansas. By use of online sources for citizen science, we elucidate the history of occurrence and present analysis of seasonal distribution of this bird in Arkansas. Individuals arrive in Arkansas as early as April, observations peak in August, and the birds may remain to late October when colder weather promotes southward migration. Most observations are of a few birds, but a maximum of 128 has been counted at one location and time. Most of the birds seen had not developed breeding plumage so were believed to be younger birds migrating northward in spring and summer to forage. The birds have been observed in 28 counties, but most observations have been in Chicot and Desha Cos. of southeastern Arkansas, bordering the Mississippi River. Several other wading birds such as storks, herons, egrets, and ibis have been reported as associates in flight or foraging. Nesting was discovered for the first time in 2020, in Ashley Co. of southeastern Arkansas.

Introduction

Populations of the Roseate Spoonbill (*Platalea ajaja*) apparently declined due to habitat loss and the millinery trade for plumes. These are wading birds that use a spatula-shaped bill to forage in shallow water. Mature birds have a pink body with red on the wings and part of the tail, and otherwise an almost orange tail, whereas juveniles are light pinkish (Dumas 2020).

The Roseate Spoonbill breeds along the coasts and increasingly into the interior of Texas, Louisiana, and south Florida, but there are no records of breeding in Alabama or Mississippi (Dumas 2020). The bird has only a short documented history in Arkansas, as it was not reported by Howell (1911), Wheeler (1924), or Baerg (1931, 1951). Further, the species was not

reported in earlier literature from neighboring Oklahoma (Nice 1931), though it was observed there in 1940, and several more records have been documented in Oklahoma in more recent years (Shackford 1991). Still, based on reports in Allen (1942), in which some Roseate Spoonbills were known to use the Mississippi Valley to wander as far north as Wisconsin, it seems plausible that the birds might have passed undetected through Arkansas.

This bird was first reported in Arkansas in 1959, from Miller County in southwestern Arkansas (James and Neal 1986). James (1974) did not include it in a discussion of threatened native birds of Arkansas because it had never been considered a breeding bird in the state. The few reports made by 1985 were from southwestern Arkansas (Hempstead, Howard, Little River, and Miller Cos.), with exceptions from Jefferson County (southeastern Arkansas) in 1973 and Pulaski County (central Arkansas) in 1985 (James and Neal 1986). Observations in Arkansas and other southeastern states, farther inland than the distribution of known breeding grounds, were thought to represent immatures ranging northward during late summer (James and Neal 1986; Dumas 2020). Oberholser (1974) previously had interpreted distributional records of the Roseate Spoonbill in Texas to indicate dispersal along watercourses northward and inland after the breeding season, in late summer and fall.

Methods and Materials

To determine distribution and dates of occurrence, we compiled records verified by the Arkansas Audubon Society and published on their website (http://www.arbirds.org/aas_dbase.html), the citizen science website hosted by the Cornell Lab of Ornithology (<https://ebird.org/explore>), and reports on the discussion list ARBIRD-L (ARBIRD-L@listserv.uark.edu) hosted at the University of Arkansas. These sources included not only locations and dates of sightings, but also comments describing

habitat, behavior, numbers of birds seen, and their avian associates.

Data were gathered into a spreadsheet and sorted various ways to reveal the history and timing of the presence of this rare bird in Arkansas. Duplicate accounts of the same observations made by different observers were deleted prior to analysis, to create a dataset with unique observations.

Increasing numbers of observations can be attributed to both an increasing number of birds over time and to an increasing number of observers making reports. We followed the method of Whitfield *et al.* (2018) to evaluate whether numbers were increasing over time by plotting the maximum group size reported at one sighting each year over the years of observation.

We examined the seasonal distribution of Roseate Spoonbills in North America to interpret whether reports of the birds in Arkansas seemed to show N-S migrations, or whether the birds might also migrate E-W. This was accomplished in eBird (eBird 2021) by use of the science tab, then application of the tab for abundance animation. We also used eBird to elucidate the distribution of breeding Roseate Spoonbills in North America for comparison with observations of breeding in Arkansas.

Results and Discussion

Distribution – The first report of a Roseate Spoonbill in Arkansas was from a swampy lake near the Red River in southwestern Arkansas (Miller Co.), observed in the fall (20 September) of 1959 (James and Neal 1986). The earliest reported date of observation was in the spring, on 21 April 2010 in northeastern Arkansas (Poinsett Co.). We report here our new observation of early arrival, on the first weekend of April in 2021, in Ashley Co.

Reported locations of Roseate Spoonbills in Arkansas, including a total of 28 counties, are included in Fig. 1. As these records are composited from citizen science, it must be understood that the data do not represent a systematic survey, and that less accessible habitats also may support summer residents and perhaps nesting pairs (Tumilson *et al.* 2020). Stars on the map represent records of observations in adjacent states, which help illustrate that these birds disperse along rivers and forage in adjacent lowlands. Observations along the Mississippi River in Mississippi, Tennessee, and Missouri indicate that Roseate Spoonbills are likely to be found more commonly in NE Arkansas than has been reported, and in the 4 counties without current records in eastern

Arkansas. Patterns of distribution relate to appropriate wetland habitat, which tends to be found along river systems in lowland regions of the state (West Gulf Coastal Plain and Mississippi Alluvial Plain). In Arkansas, these rivers include the Red, Ouachita, Arkansas, White, and Mississippi.

Although sightings of Roseate Spoonbills have occurred in 28 counties (Fig. 1), about 71% of the 287 unique statewide observations occurred in only 4 counties. Most (52.7%) were in the 2 southeastern counties bordering the Mississippi River (29.7% in Chicot Co. and 22.9% in Desha Co.). Bald Knob National Wildlife Refuge (BKNWR) accounted for almost all of the observations in White Co. (10.8% of the total statewide observations), and 7.5% of the total observations were on farms in Lafayette Co. in southwestern Arkansas.

Sightings of only 1-2 birds occur from the time of first documented arrival, on 21 April, through 9 October. Those observations account for 44.4% of the reported sightings. Groups of 3 birds appear by 11 May, 4 by 19 July, and 5+ by 22 July. Groups of 20+ birds appear earliest on 13 August but are most common in September and October.

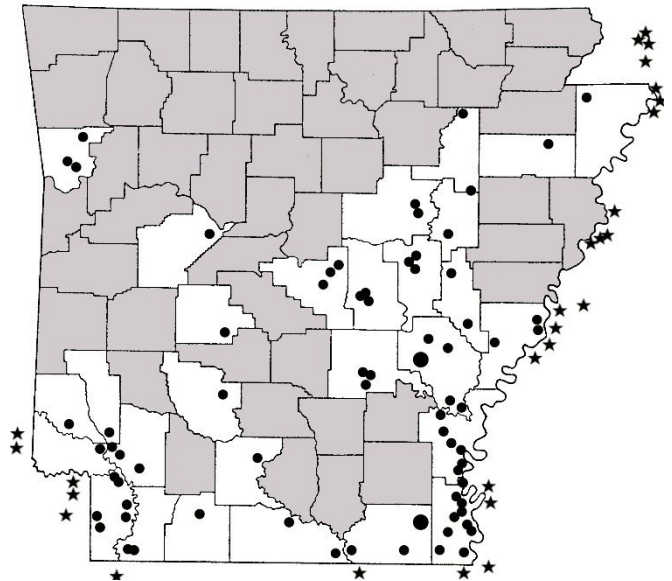


Figure 1. Distribution of the Roseate Spoonbill (*Platalea ajaja*) in Arkansas (1959-2020) based on literature and records compiled from citizen science websites. Dots indicate locations of observation (but multiple observations during the same or different years are not represented by additional dots). Stars represent locations reported in eBird for adjacent states. The enlarged dot in Ashley Co. (southeastern Arkansas) represents the verified breeding location in Arkansas, and the large dot in Arkansas Co. is the location of the second likely breeding record.

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Ten or more birds have been documented at one time in Ashley, Chicot, Desha, Lafayette, Lonoke, Miller, Monroe, Prairie, Pulaski, and White Counties. The largest numbers of birds seen simultaneously have been repeated observations in 2005 and 2010 at Camp Nine in Desha County (with a maximum of 128 birds counted on 25 September 2005). Observers have reported a group of 65 birds at the Mississippi Levee in Chicot County, and as many as 30 individuals were seen at BKNWR in White County on 11 September 2017.

Examination of historical distribution shows the longest term of continued occurrence in the lowlands of southeastern Arkansas along the Mississippi River, and in southwestern Arkansas near the Red River system (Fig. 2). From 1959-1969, the species was recorded only from Hempstead, Jefferson and Miller Cos., and during the decade of 1970-1979, the bird was reported from only Miller and Jefferson Cos. It would be almost 2 more decades before Roseate Spoonbills were recorded again from those counties.

From 1980-1989, observations were reported from a total of 7 counties, all of them new (Chicot, Clark, Desha, Garland, Howard, Little River, and Pulaski). In the decade from 1990-1999, again 7 counties were reported but 4 of these were new (Ashley, Lonoke, Mississippi, and Union).

Interest in birds and reporting of records increased after 2000 (Tumlison *et al.* 2020), but apparently an

actual influx of Roseate Spoonbills occurred as well. From 2000-2009, occurrence was reported in 12 counties including the addition of 5 more counties (Phillips, Prairie, Monroe, White, and Yell). From 2010-2020, observations increased dramatically with records from 20 counties, including 9 new counties (Arkansas, Columbia, Crawford, Jackson, Lafayette, Phillips, Poinsett, Sevier, and Woodruff).

Roseate Spoonbills have been present but are very uncommon in Arkansas from April through June. Sparse observations during May (Chicot, Hempstead, Monroe, and Woodruff Cos.), and June (Chicot, Desha, Lafayette, and White Cos.) account for only 9 of 287 unique observations (Fig. 3). Of the remaining available records, 27 (9.7%) occurred in July, 122 (43.7%) in August, 98 (35.1%) in September, and 30 (10.8%) in October. The latest date of observation in Arkansas was a group of 5 birds seen on 12 November 2005 in Desha Co.

The great increase in August likely includes birds that nested along the coasts of Louisiana and Texas and migrated northward to feeding grounds. Chronological data from eBird showed that populations from southern Louisiana and southeastern Texas appeared to migrate N along the Mississippi and Red Rivers, and populations in Florida moved N into the Florida panhandle or into Georgia and South Carolina. Few records occurred in Mississippi and Alabama, and there was little evidence of E-W migration. As fall approaches, the birds begin a seasonal migration southward and are mostly absent from Arkansas by late October.

Age-identified birds reported from April through July were immature individuals, therefore hatched in the previous breeding season, and a few unmated adults also were noted. The latter include accounts of

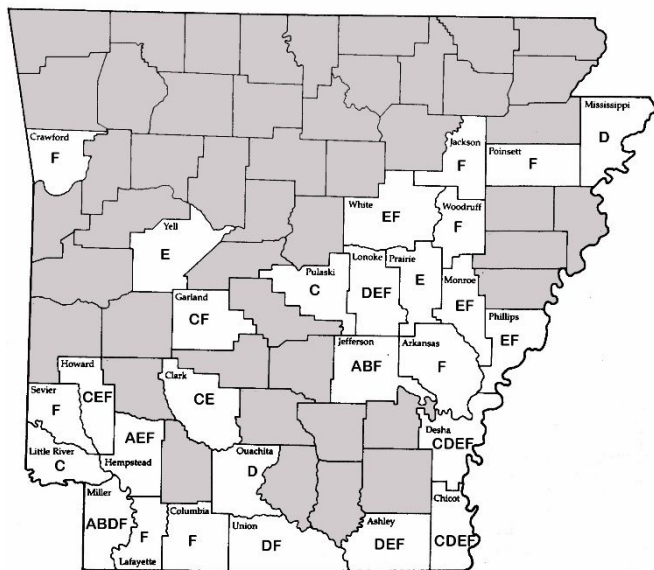


Figure 2. Historical distribution of the Roseate Spoonbill in Arkansas. Unshaded counties have records, and lettering represents time frames for the records: A = 1959-1969, B = 1970-1979, C = 1980-1989, D = 1990-1999, E = 2000-2009, and F = 2010-2020.

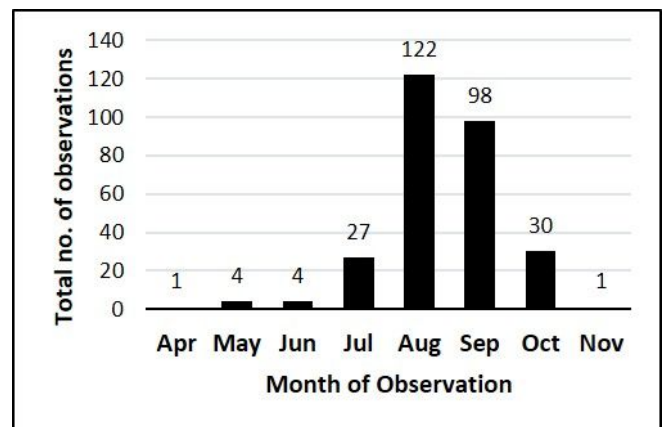


Figure 3. Monthly frequency of reported observations of Roseate Spoonbill (*Platalea ajaja*) in Arkansas, 1959-2020.

single birds in Poinsett Co. (21 April), Hempstead Co. (3 July), and Pulaski Co. (9 July). Spoonbills identified as adults otherwise do not appear until late July and have been seen mostly in August and September. Adults migrating northward after the breeding season usually are single birds, and have been documented scattered over several counties, including Ashley, Chicot, Desha, Hempstead, Jefferson, Lafayette, Lonoke, Miller, Poinsett, and Pulaski. Eight adults were seen together in Chicot Co. on 10 August, along with 57 young birds.

The pattern of monthly occurrence also must be viewed cautiously, as reports are based on citizen science and the communicated presence of a rare species often results in multiple reports of the same birds over several days or weeks if the birds remain at the same site. This attribute inflates the numbers of observations of those birds, although these same data reflect continued presence over time. Further, the same individuals may move short distances and thus be documented at various locations. Strings of sightings only short distances from each other (e.g., the string of sightings in Chicot and Desha Cos. in southeastern Arkansas, see Fig. 1) may sometimes represent the same individual spoonbills that moved among a variety of locations.

The general pattern of historic occurrence indicates that Roseate Spoonbills seen in Arkansas from April-July represent unmated individuals and juveniles, then fledged birds and post-nesting adults enter the state from July-September. These likely are mostly dispersers from April-August following the breeding season farther south, an interpretation consistent with other observers (Oberholser 1974; Dumas 2020). After northward dispersal and foraging through late summer, individuals apparently return southward with onset of colder weather.

The increasing maximum group size of flocks seen since about the year 2000 (Fig. 4) indicates that more Roseate Spoonbills are becoming summer migrants into Arkansas. From 1966 to about 2000, only 1-2 birds were seen together at a time. During the last 20 years, the size of the largest flocks has increased appreciably (although there is much yearly variation, with a maximum group of 128 in 2005). This kind of plot helps reduce the bias of more observers and greater frequency of reporting through citizen science portals (Whitfield *et al.* 2018) and complements the observation that the birds also are being observed in more counties in recent years (see Fig. 2).

Associates – Avian species found associated at

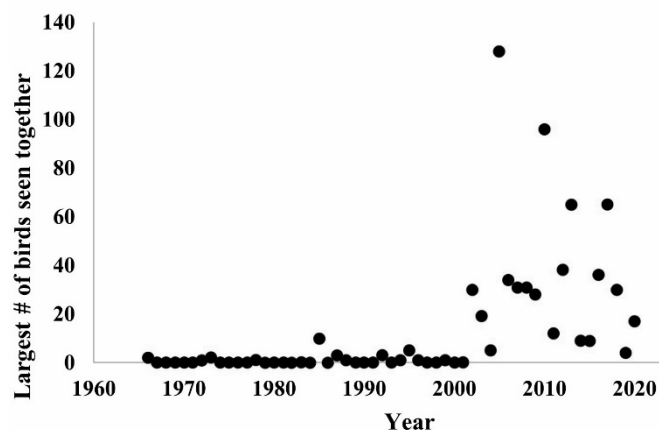


Figure 4. Maximum group size of single flocks of Roseate Spoonbills reported in Arkansas, plotted by year. Increases since 2000 indicate expanding range into Arkansas.

feeding sites help define the nature of a foraging habitat used by a bird of interest. In Arkansas, reported feeding associates of the Roseate Spoonbill include egrets (Chicot, Crawford, Desha, Jefferson, Miller, Sevier, and White Cos.), herons (Chicot, Desha, and White Cos.), White Ibis (Chicot Co.), and Wood Storks (Chicot and Lafayette Cos.). Several times, only the term “egret” or “heron” was mentioned without species definition. When the species was listed, egrets included Cattle, Great, and Snowy, and herons specified only Great Blue. In May, June, and July 2020, KR observed those 3 egret species, Great and Little Blue Herons, and White and White-faced Ibis along with Roseate Spoonbills at 2 nesting sites in Arkansas and Ashley Cos.

These species are wading birds that commonly tend to associate and feed in shallow waters. Unlike most associated species, Roseate Spoonbills feed in a characteristic pattern of swinging the spatulate bill from side to side to intercept small fish, crustaceans, and aquatic insects (Dumas 2020), which is a pattern also sometimes seen in White Ibis (Kushlan 1977).

Reproduction – Roseate Spoonbills were not known to breed successfully in Arkansas until discovery of nests on 24 May 2020 near Montrose (Ashley Co., Fig. 1). The species had been reported in Ashley Co. 28 years earlier - a single individual seen on 15 July 1992 in Overflow National Wildlife Refuge (ONWR), located several km southwest of the Montrose breeding location. Ten years later, Roseate Spoonbills were again reported at ONWR between 28 July and 31 August, usually with only 1-3 individuals sighted, until 21 birds were observed on 13 August and

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30 on 20 August 2002. Spoonbills were reported at ONWR also between 10 August and 9 September in 2011, 2014, and 2018.

All birds for which information was available were categorized to be in immature or first year plumage, except for 1 adult observed on 30 July 2002. In neighboring Chicot Co., numerous observations of the birds over 33 years (since 1987) reported adults only in August and September (after the breeding season).

Thus, for the known history of presence in Ashley Co., there had been evidence only of immature birds found in the late season, but no breeding pairs in Ashley Co., or any other part of Arkansas, during the expected nesting season of April-August known in Louisiana and Texas (Oberholser 1974; Dumas 2020).

On 24 May and 18 June of 2020, a photographer (Jami Linder) captured images of wetland birds near Montrose in Ashley Co. of southeastern Arkansas (Zellers 2020). The site was a wetland within a farming area near Montrose. The head of the Arkansas Game and Fish Commission's nongame migratory bird program (KR) subsequently identified the species in the images. Finding Roseate Spoonbills among the birds, she requested the photographer to try to get images of nestlings, and filed a report of rare birds on ARBIRD-L. On 24 May 2020, 2 birds were seen on nests, and on 18 June, 8 adults were seen. Other Roseate Spoonbills were carrying nesting material at the time. Discovery of the new species nesting in Arkansas was popularized in a state newspaper (Arkansas Democrat-Gazette, 21 June 2020, p 1A).

Zellers (2020) reported that Linder and Rowe had spotted about 32 Spoonbills, including 20 adults, 8 young that were still bound to nests, and 4 young that were learning to fly. Those observations were made on 1 July (KR, *pers. obs.*).

Some Roseate Spoonbills at the Ashley Co. site were incubating eggs while others had young almost ready to fledge. Roseate Spoonbill eggs hatch after 22 days of incubation, and the birds fledge after about 6 weeks of development (White *et al.* 1982). It is unknown why the range in the timing of nest building was spread over several weeks at the Arkansas site. A couple of hypotheses include the age of the adults (perhaps first-time nesters breed later than older adults), or the timing of nesting might have been related to limited availability of quality nest sites.

The birds left the Ashley Co. nest site during the third week of August 2020, and in 2021 returned the first weekend of April (KR, *pers. obs.*). Current studies are to locate foraging areas and emergent wetlands near the breeding site.

Presence of Roseate Spoonbills in breeding plumage and during the breeding season at another location in southeastern Arkansas indicates another likely nesting site (Zellers 2020). Adult Roseate Spoonbills were observed roosting in trees on the Hampton Reservoir near Lodge Corner, Arkansas Co., on June 3 (KR, *pers. obs.*, see Fig. 1). The landowner (Rick Hampton) previously had seen these birds on the reservoir only in late summer. The birds were roosting at the edge of the reservoir, but sites with likely nests were completely inaccessible by boat or foot and use of a spotting scope did not allow conclusive examination of the presumed nesting site. At least 2 nests were suspected in young cypress and buttonbush.

A breeding abundance map for Roseate Spoonbills generated in eBird showed a northward extension along the Mississippi valley, about two-thirds up the state of Louisiana. Thus, new records of nesting in Arkansas would be expected along the Mississippi, but the new breeding records we report are considerably extralimital to the historically known breeding range.

Management and Conservation – The property that supported the nesting birds in Ashley Co. is managed through the WRP as waterfowl habitat, located within a farming region used primarily for rice and soybean row crops. Other wetland birds associated with the Roseate Spoonbills at the nest site included Anhinga, Cattle and Snowy Egrets, Little Blue and Great Blue Herons, Yellow-crowned and Black-crowned Night Herons, Least Bitterns, White-faced Ibis, and Common Gallinules (Zellers 2020). Some of these birds also were breeding at the site.

Roseate Spoonbills forage in emergent wetlands with water depths up to 20 cm (Powell 1987), but depths of about 12 cm or less are preferred (Lewis 1983), likely because depths below 13 cm are linked to higher nest production rates (Lorenz 2014). Nests in inland forested swamps have been reported in small trees and shrubs such as buttonbush (*Cephalanthus occidentalis*), and under the canopy of hardwood trees such as water oak (*Quercus nigra*) and elms (*Ulmus* sp.) (Dumas 2020). Linder's photos of the Ashley Co. nests in Zellers (2020), and posted by the Arkansas Democrat Gazette newspaper <https://www.arkansasonline.com/galleries/29987/album/> showed some of the stick nests in lower branches of bald cypress (*Taxodium distichum*) trees just above the level of buttonbush, and the observers also mentioned nests constructed on the buttonbush. Buttonbush may reach a height of about 5m (16 ft.) (Ogle *et al.* 2020).

Management favoring early successional hemi-

marsh wetlands (such as the Wetland Reserve Program, WRP) in southeastern, and perhaps southwestern, Arkansas could aid in improving foraging habitat for Roseate Spoonbills. More mature WRP wetlands with established bottomland hardwood tree species could create additional breeding habitat for Roseate Spoonbills (Zellers 2020). This bird is not an historic breeder in Arkansas, but its seasonal natural presence is an attractor for bird enthusiasts, and therefore is also of economic value to the state. Furthermore, several species of wading birds that associate with Roseate Spoonbills benefit from the same management strategies. Restoration of such wetlands also is important for soil hydrology.

Acknowledgments

We thank the many bird enthusiasts who systematically collect and report observations of birds, Jami Linder who took the first photographs of Roseate Spoonbills nesting in Arkansas, and the anonymous landowner whose interest in avian conservation created the habitat in which the birds nested. We thank Dan Scheiman for his efforts in updating the eBird data base for Arkansas birds, which made this project much easier to conduct. Rick Hampton provided access for viewing Hampton Reservoir, which provided evidence of a second likely nesting site for these birds in Arkansas.

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